

REMARKS

Upon entry of the foregoing amendments, claims 1, and 3-20 are pending in the application. Claim 2 has been cancelled without prejudice or disclaimer to the subject matter contained therein. Claim 1 has been amended to clarify the inventive subject matter. Basis for the amendment can be found in previous claim 2 and paragraph 38 of the published application. The latter describes in detail the photochemically initiated deposition of silver on a titanium dioxide particle, wherein silver ions are first adsorbed on the dioxide surface and then reduced by electrons which are induced by UV radiation. Accordingly, it is clear from this teaching that the shell is directly deposited on the core-particle without the need of any linker molecules. Therefore the amendment does not introduce any new subject matter within the meaning of 35 U.S.C. § 132.

REJECTION UNDER 35 U.S.C. §103(a)

Mulvaney, et al. in view of Oldenburg, et al.

Claims 1-20 have been rejected under 35 U.S.C. § 103 (a) as being anticipated by Mulvaney, et al. (U.S. Patent No. 6,548,168) in view of Oldenburg, et al. (U.S. Patent No. 6,344,272).

Applicants respectfully traverse this rejection. Mulvaney, et al. and Oldenburg, et al., when considered alone or in combination, fail to teach each and every limitation of the claimed subject matter.

Claim 1 recites an antimicrobial polymeric coating composition, in particular an antimicrobial coating material, comprising core-shell particles having a core and at least one

shell directly deposited thereon, wherein the core comprises nanoscale particles of an inorganic material with semiconductor properties having a particle size <100 nm, and the shell is formed by at least one metal having an antimicrobial action. Specifically, the shell is deposited directly on the surface of the core without the use of any linker molecules.

In contrast, both Mulvaney, et al. and Oldenburg, et al. require the presence of linker molecules as mandatory for use as a "bonding layer" between the core and the shell.

The core shell particles taught by Mulvaney, et al. comprise core particles, which may comprise a metal, such as copper, silver, gold, or platinum; a metal compound, such as metallic sulfide, metallic halide, etc.; or a semiconductor nanoparticle such as cadmium sulfide, germanium, zinc sulfide, etc. See, for example, claims 3-8. The shell, or "coating layer", is selected from silica; Se; an organic conducting polymer; a metal, such as platinum, palladium, iridium, bismuth, copper, silver, gold, and mixtures thereof; a metal oxide; a metal sulfide; a metal selenide; a metal telluride; and a metal halide. See, for example, claims 13-20.

Further, Mulvaney, et al., as shown in Examples II-V, describe the synthesis of the core particles. In a second step, a layer of linker molecules is attached to the core followed by the attachment of metal clusters as "seed" colloids to the free end of the linker molecules. The final growth of the shell can then take place via the enlargement of the clusters attached to the linker molecules as seed colloids.

Similarly, the core shell particles described by Oldenburg, et al. comprise a nonconducting core (layer) and a conducting shell layer. See, for example, claim 1. The conducting shell

layer may comprise a metal selected from coinage metals, noble metals, transition metals, synthetic metals, an organic conducting material or metal alloy. See, for example, claims 2-5. The core of Oldenburg, et al. comprises a dielectric or semiconducting material, such as silicon dioxide, titanium dioxide, PMMA etc. or mixtures thereof. See, for example, claims 7-11.

Further, the core-shell particles of Oldenburg, et al. are synthesized similarly to the method described above in Mulvaney, et al. See, for example, claims 1 and 2. Core particles are provided together with a bifunctional ligand, represented by the formula A-X-B to provide a core particle ligand admixture. The first functional group, A, is capable of binding specifically to the core particle and therefore alters the surface state of the particle. The second functional group, B, activates the core particle for nucleation of a coating layer. X is a linking group. In a subsequent step, the mixture of the core particle and the ligand is added to a source of coating and the bifunctional ligand and coating are allowed to deposit upon the particle. Alternatively, a source of the core particle maybe admixed with a source of coating to provide a core particle coating admixture to which the bifunctional ligand is added. According to the general procedure described in the example the formation of the coating can take up to a few days, for example five days in the case of the deposition of silica on CdS particles. See, col. 9, lines 3-6.

Finally, the Examiner may consider that the coatings according to the present application may be easily prepared. The coating of core particles is accomplished within a few minutes. Specifically, a coating thickness of 1 nm can be achieved in about 10 minutes. See, for example, paragraphs 39-44 of the published application. The core shell particles obtained in this

way are provided in the form of a thick aqueous paste, which can be directly incorporated by stirring, e.g., into an acrylic coating material, providing a coating material with outstanding antimicrobial properties. See, for example, paragraphs 45-46 of the published application.

In contrast, the core shell particles according to Mulvaney, et al. and Oldenburg, et al. would be comparatively difficult to produce. As a result, particles according to these references would also be expensive and time consuming to produce.

Therefore, the subject matter of the present application, e.g., core shell particles with the shell directly deposited on the surface of the core without the use of any linker molecules is neither taught or disclosed by Mulvaney, et al. or Oldenburg, et al. Furthermore, the combination of these two references does not produce the presently claimed subject matter.

Accordingly, Applicant respectfully asks that the Examiner reconsider and withdraw this rejection.

**CONCLUSION**

In view of the foregoing, Applicant respectfully request the Examiner to reconsider and withdraw the outstanding rejections to the claims pending in this application.

If the Examiner has any questions or wishes to discuss this matter, the Examiner is welcomed to telephone the undersigned attorney.

Respectfully submitted,

**NATH & ASSOCIATES PLLC**

Date: Nov. 28, 2005

  
\_\_\_\_\_  
Gary M. Nath  
Reg. No. 26,965  
Tanya E. Harkins  
Reg. No. 52,993  
Customer No. 20529

**NATH & ASSOCIATES PLLC**  
1030 Fifteenth Street, N.W.  
Sixth Floor  
Washington, D.C. 20005-1503  
Tel: (202) 775-8383  
Fax: (202) 775-8396